MUREP Curriculum Awards (MCA)

Title: Remote-sensing and Analytics for Integrating Science Education with NASA SMD to Strengthen Student Research Capacity at MSI (RAISE)

Institution: The University of Texas, Rio Grande Valley

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Despite recent efforts to increase participation and retention rates, Blacks and Hispanics remain underrepresented in the science, technology, engineering, and math (STEM) workforce. One field that highlights this issue is Earth and Environmental Science (EES), where only 6.2% of Hispanics are represented in 2021. Meanwhile, minority-serving institutions (MSIs) are often overlooked as resources for strengthening the STEM workforce. This is evident in the case of the University of Texas Rio Grande Valley (UTRGV) and South Texas College (STC) in the Lower Rio Grande Valley (LRGV) of south Texas, where STEM intervention programs are limited despite serving over ~ 60,000 students, the majority of whom are Hispanic (> 90%). Many of these students need help with challenges, such as being non-traditional learners, first-generation students, and individuals from low-income backgrounds. These students require enhanced STEM proficiency to be competitive in the national job market, particularly in computing and technology. Thus, it is crucial to develop sustainable STEM intervention programs at MSIs. Previous intervention programs have often lacked continuity due to inconsistent funding, resulting in finite temporary impacts. More importantly, there are very few training programs that specifically support and prepare minority students for conducting research and pursuing careers aligned with NASA Science Mission Directorates (SMD), which hampers NASA's efforts to build a diverse next-generation workforce.

To address these challenges, the PI team at UTRGV has proposed RAISE, a project to develop a pilot model to enhance the curriculum and provide professional preparation for EES fields, aligning with NASA SMD in Earth and Planetary Science. First, RAISE will redesign traditional instruction methods to incorporate NASA data into learning activities. RAISE plans to include remote sensing and data analytics training modules covering land-water interactions in geomorphology, hydrology, and soil science classes. By doing so, students will gain the skills to analyze NASA's remote sensing data and conduct basic research relevant to SMD objectives and the local communities in LRGV. By incorporating STEM training intervention into existing classes, RAISE aims to overcome the challenge of funding inconsistency often faced by traditional models, making the program more sustainable in the long term. RAISE will also provide the curriculum improvement model and course materials to faculty at UTRGV and STC

by the end of Year 2 via a one-week-long faculty workshop. Finally, RAISE will enhance UTRGV's STEM laboratory by adding high-performance desktop computers, camera drones, and soil probes to provide students with hands-on learning experiences and practical skills essential for EES fields. Second, RAISE will offer a seminar series that includes scientists from R1 universities, NASA centers, and industry. This seminar will expose students to NASA-related opportunities and research areas and allow them to network with potential graduate school advisers and employers in STEM fields. From the seminar attendees, RAISE will select ten students in Years 2 and 3 to attend ten-week-long internships at Johnson Space Center, Jet Propulsion Laboratory, the University of Texas at Austin, and Oak Ridge National Laboratory Distributed Active Archive Center. The PI team will work with collaborators to design and include undergraduate research projects that address questions that are priorities for Earth and Planetary Science Division at NASA. By incorporating course improvement, faculty development, and student experiential learning opportunities into the existing infrastructure at UTRGV and STC, RAISE will be a sustainable long-term solution for training the next generation of scientists leading discovery and innovation at NASA and beyond.